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IS 11517 (1985): Methods of Tests for air and airland cargo pallets [TED 14: Aircraft and Space Vehicles]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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Indian Standard

METHODS OF TEST FOR AIR AND AIR-LAND CARGO PALLETS

1. Scope — Lays down test requirements and methods of test for air and air-land cargo pallets conforming to IS : 11499-1985 'Specification for air and air-land cargo pallets'.

2. Terminology — For the purpose of this standard, the definitions given in IS : 7073 (Part I)-1973 'Glossary of terms relating to air cargo pallets and containers: Part I Air cargo pallets', shall apply.

3. General

3.1 The methods of test described are intended to demonstrate that the pallet meets the design requirements.

3.2 The tests are static in nature to minimize the complexity and cost of the required testing facilities. As far as is practicable, the applied static loads shall take into account the combined static and dynamic loads anticipated in service.

3.3 It is intended that tests shall be non-destructive in nature and shall not result in damage to the pallet unless ultimate load conditions are employed.

3.4 Test equipment and the methods of testing described are meant to demonstrate that the pallet meets the requirements of this standard. Other equivalent methods may be employed to obtain the desired results.

3.5 In selected cases, tests may be repeated under ultimate load conditions when required for substantiation of analytical data. If this becomes necessary, the pallet so tested may not be used in service unless all its component parts have been inspected and those that exhibit permanent deformation have been replaced.

4. Test Criteria

4.1 A pallet shall be considered satisfactory if, upon inspection before and after testing, its dimensions fall within those specified in Tables 1 and 2 in IS : 11499-1985, and in the applicable manufacturing drawings.

4.2 Permanent deformation, if evident, is acceptable at completion of testing to show that the ultimate loads can be restrained, but there shall be no failure to the extent that allows discharge of cargo or allows the pallet to break free from the restraint system.

5. Recommended Test Equipment

5.1 When restraint or movement on an aircraft system is evaluated, the test system shall be in accordance with 4.3.3.3 of IS : 11499-1985. Latches and guide-rails of suitable strength shall be provided to secure the pallet at its latch points and guide it along the conveyor. The test system shall be of sufficient length to permit cycling of the longest pallet to be tested.

5.2 When conducting a structural test, sufficient payload to meet load requirements shall be provided. Where appropriate water may constitute the payload, or load producing devices may be used.

5.3 An industrial truck or equivalent equipment capable of supporting a maximum load of 5 440 kg on one axle, with a minimum wheel width of 178 mm and a maximum footprint area of 142 cm² per wheel on 762 mm wheel centres shall be provided.

5.4 A net in accordance with IS : 11553-1986 'Specification for air and air-land cargo pallet nets' shall be provided.

5.5 For type B pallets, a crane or lifting means with capacity to lift twice the gross weight of the loaded pallet shall be provided. Sufficient height shall exist under the hook to permit positioning of the pallet vertically on either side or end. Bridle chains, cables or spreaders with capacity to lift the loaded pallet at the four corners together with appropriate capacity hooks or shackles shall be provided.

Adopted 16 December 1985

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6. Test Procedure — Operational Loads

6.1 Test No. 1 — Lifting

6.1.1 Type B pallets — Load equal to twice the gross weight and lift vertically from the four corner fittings. After lifting, allow the pallet to remain suspended for not less than 5 min and then lower it to the ground. No permanent deformation shall occur.

6.1.2 Type II B pallets — Load equal to twice the gross weight and lift clear to the ground by using a forklift truck of suitable capacity. After lifting, allow the pallet to remain suspended for not less than 5 minutes and then lower it to the ground. No permanent deformation shall occur.

6.2 Test No. 2 — Pallet Strength

6.2.1 The base of the pallet undergoing the test shall rest on a surface of sufficient strength and continuity to adequately support the pallet. Manoeuvre an industrial forklift truck, loaded to an axle weight of not less than 5 440 kg (including the weight of the truck) or 2 722 kg per wheel applied to a contact area of not more than 142 cm² (assuming a wheel width of not less than 178 mm and wheel centres 762 mm apart), over the entire pallet top surface to load the pallet to maximum gross weight. Then manoeuvre an industrial forklift truck, loaded to 4 082 kg per wheel, over the area extending 457 mm from any edge.

No permanent deformation or failure shall occur.

6.2.2 While retained on the aircraft loading system or its equivalent, load the pallet uniformly to 5 864 kg/m². The load shall be applied over an area 1 520 mm wide centred in the pallet and the load shall equal but not exceed three times the maximum payload.

No permanent deformation or failure shall occur.

6.2.3 The pallet under test shall be latched to the aircraft system or its equivalent. The number of latches specified in 4.7.4.1 of IS:11499-1985 shall be engaged on one side and adjusted by suitable means to ensure contact with the end of the latch receptacle slot. With a net in accordance with IS : 11553-1986 attached to the pallet, apply a uniformly distributed load equal to the gross weight to one 2 440 mm wide end of the net. The centre of gravity of the load shall be 120 mm vertically measured from the pallet bottom surface and within the lateral and longitudinal limits specified in 4.7.6 of IS : 11499-1985.

No permanent deformation or failure shall occur.

For 3 m pallets, the test specified in 6.2.3 using only restraints in fore and aft slots in accordance with Fig. 12 of IS : 11499-1985.

6.2.4 With the pallet on the aircraft system or its equivalent, 50 to 60 percent of all the latches per Fig. 11 of IS : 11499-1985 equally distributed on both sides, shall be engaged and adjusted by suitable means to ensure vertical restraints. With a net in accordance with IS : 11553-1986 attached to the pallet, apply a uniformly distributed load equal to the gross weight to one side of the net. The centre of gravity of the load shall be 1 200 mm vertically measured from the pallet bottom surface and within the lateral and longitudinal limits specified in 4.7.6 of IS : 11499-1985.

No permanent deformation or failure shall occur.

6.2.5 Suspend the pallet upside down under the aircraft loading system or its equivalent. Between 50 percent and 60 percent of the total number of latches, equally distributed on both sides, shall be engaged and adjusted by suitable means to ensure contact when the load is applied. The pallet shall support a load equal to the gross weight, uniformly distributed, and tied down with a net complying with IS : 11553-1986.

No permanent deformation or damage shall occur.

6.2.6 Repeat the test specified in 6.2.5 for 3 m pallets, using only restraint in accordance with Fig. 12 of IS : 11499-1985.

6.2.7 The pallet shall be uniformly loaded to gross weight and cycled one hundred times over a substantially level test system per 4.3.3.3 of IS : 11499-1985 at a minimum speed of 18.3 m/min.

6.2.7.1 The test section shall be supported on a rigid, welded steel, wood or concrete structure.

6.2.7.2 The rollers used in the test section shall conform to 4.3.3.3 of IS : 11499-1985. The shell of the roller shall be of high quality aluminium alloy. The bearings used in the rollers shall be selected so as to ensure that the coefficient of friction of the test system does not exceed 0.02 at 1.0 g loading.

6.2.7.3 The maximum displacement of the tops of the rollers from a theoretical plane shall be varied randomly to a maximum of ± 0.76 mm.

6.2.7.4 Each cycle shall be equal to twice the pallet length.

6.2.7.5 At test speed, drawbar pull shall be recorded during the first and last cycle. The maximum allowable drawbar pull shall be 3 percent of the gross weight. The maximum variation of the drawbar pull from the first to the last cycle shall not exceed 0.05 percent of the gross weight.

6.2.8 Attachment receptacle test.

6.2.8.1 *Cargo tie down* — A two stud bulk tie down fitting shall be used to fit a receptacle in accordance with IS : 11165-1985 'Specification for air-craft seat rails and pins'. With the pallet latched to the aircraft system or its equivalent 50 to 60 percent of all the latches, equally distributed on both sides, shall be engaged and adjusted by suitable means to ensure vertical restraint. Test the pallet receptacle by applying a 2 268 kg tensile load in all directions from the horizontal to the vertical. The load application point shall be 20 mm or less from the head of the stud.

6.2.8.2 *Net attachment* — A one stud net attachment fitting in accordance with IS : 11165-1985 shall be engaged in the net attachment receptacle complying with IS : 11165-1985. Test the pallet receptacle by applying a 1 361 kg tensile load in all directions, from the horizontal to the vertical. The load application point shall be 20 mm or less from the head of the stud.

6.2.9 For Type B pallets while supported at the four corners, proceed as follows.

6.2.9.1 Repeat test 6.2.1.

6.2.9.2 Load the pallet as specified in 5.2.1 of IS : 11499-1985.

No permanent deformation or damage shall occur.

6.3 Subject any parts that cannot be adequately protected against corrosion to a test, duplicating the anticipated environment. Subsequent corrosion shall not preclude the parts from performing their design functions or cause failure of the pallet during the design life of the pallet.

6.4 Place the pallet, empty, in a suitable test chamber at 70°C ambient temperature for 48 h.

6.4.1 At the end of 48 h, evaluate its condition while the structure is at or near test temperature.

6.4.2 Place the pallet, empty, in a suitable test chamber at -55°C ambient temperature for 48 h.

6.4.3 At the end of 48 h, evaluate its condition while the structure is at or near the test temperature.

7. Production Pallets

7.1 To show compliance with its specification standard, commercial inspection and quality control methods and practices shall be used to ensure that production units are not inferior to the article tested. Where changes are made to production units and product similarity cannot be clearly established, the first product so changed shall be retested to show compliance with its specification.

8. Marking Requirements

8.1 All pallets covered by this standard shall be marked in accordance with the following minimum requirements. The markings shall be permanently engraved on the top surface, not more than 25.4 mm from the outer edge of the aircraft pallet. The engraving shall be positioned on two sides diagonally opposite to one another within 300 mm of the corner.

Actual weight, tare..... kg

Maximum gross weight..... kg

The letters and numbers shall not be less than 4.8 mm high.

Note — All weights to be rounded off to the next highest 0.5 kg.

8.2 The following additional manufacturer's markings shall be permanently indicated on the top surface not more than 25.4 mm from the outer edge of the aircraft pallet. The letters and numbers shall not be less than 4.8 mm high.

Manufacturer.....

(Name)

(Country)

Part Number.....

EXPLANATORY NOTE

This standard lays the method of test for air and air-land cargo pallets and the specification for these pallets have been covered in IS : 11499-1985

In order to facilitate international co-ordination on this subject, this Indian standard is based on and is in line with ISO 4117-1980 'Air and air-land cargo pallets - Specification and testing', issued by the International Organization for Standardization (ISO).